STUTTERING ADAPTATION, REACTIVE INHIBITION AND SPONTANEOUS RECOVERY

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The Problem

It was observed during the shadowing therapy sessions to the stutterers that in any single session of thirty minutes duration the number of stuttered words went on decreasing but only to a certain point. There after the number of stuttered words gradually started increasing, finally reaching the initial level. Thus the problem of the present investigation was to determine whether this tendency for initial drop and a gradual increase in the number of stuttered words was something particular to speech-shadowing or is also true of ordinary continuous reading.

Procedure

Eighteen male stutterers attending the All India Institute of Speech and Hearing at Mysore were the subjects. The mean age of the sample was 18.30 years. The average duration of the complaint was ten years. In terms of severity the majority of them exhibited severe stuttering, but in general the sample was a mixed one. Two of them were working engineers, one a clerk and the rest of them students.

All the subjects were in for consultation. Before they were put on any form of therapy the subjects were taken for the first part of the study. They were seated across a table and were asked to read continuously in their usual fashion long passages from Kannada magazines for a period of thirty minutes. The passages selected for reading were not familiar to the subjects. An attempt was made to select passages such that they would match the interest pattern and educational background of the subjects. The level of difficulty was changed according to the general education of the subjects.

The experimenter sat before the subjects and marked the number of stuttered words for every five-minutes separately; in all six successive periods of five-minutes duration. Thus the total individual session lasted thirty minutes.

For the purpose of the study all repetitions, hesitations and prolongations were defined as stuttering and were counted as such. The total number of stuttered words in the each five-minutes period were counted and further summed for the group thus obtaining number of stuttered words in the 1-5, II-5, III-5, IV-5, V-5 and VI-5 minutes duration.

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In the second part of the study ten subjects from the original sample of 18, who were receiving shadowing therapy for their stuttering were studied for adaptation effects at a time when their difficulty was reduced at least by 50 per cent. This evaluation was done simply on the basis of the number of stuttered words while reading normally for thirty minutes.

Results

The result of the first part of the study is presented in Figure I. It is evident from the curve that in terms of the extent of reduction, the adaptation effect was greatest during the second-five minutes period. The group had stuttered on 805 words during the first five minutes. For the second-five minutes the same number was 656. The subjects, however, continued to stutter less, indicating continued adaptation effect till the end of the fourth five minutes. In the third five minutes the subjects stuttered on 647 words and in the fourth-five, they did only on 602 words. Apparently, the group reached the maximum limit of adaptation by the end of the fourth-five minutes. From then onwards, however, the number of stuttered words were not on the decrease as should be expected from a study of early literature, but were on the increase. The group which stuttered only on 602 words during the fourth-five minutes, stuttered on 687 words during

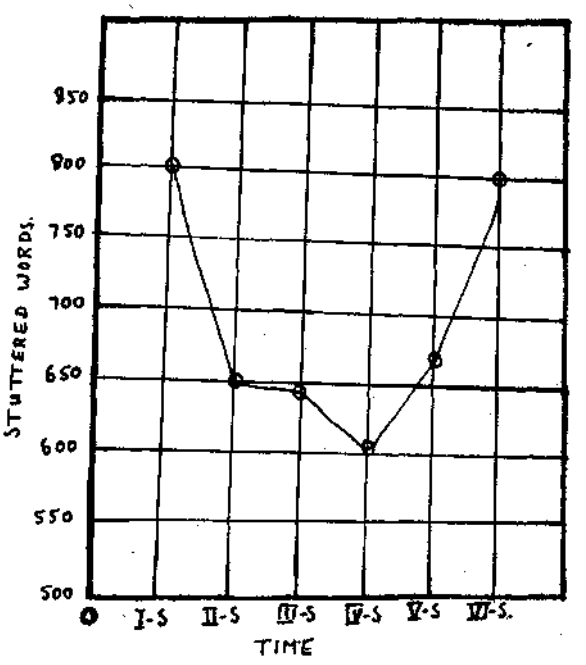
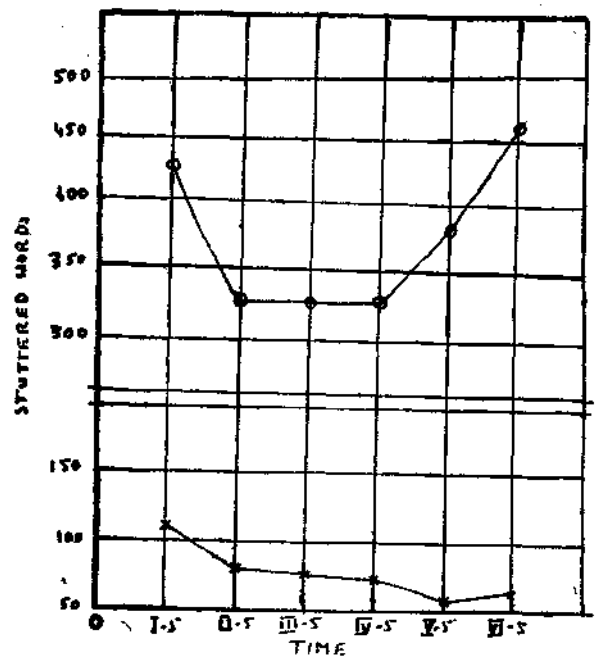


FIG. I

the fifth-five minutes which further went upto 850 words in the final sixth-five **minutes. In other** words, sometime after the fourth-five minutes the group had ceased to show any further adaptation; by the fifth-five minutes the stuttered words were on the increase; and by the sixth-five minutes, the subjects were in fact stuttering more often than they were to start with.

The result of the second part of the study is presented in Figure II. It shows the adaptation scores of ten subjects before and after shadowing therapy. (After therapy, however, simply means scores obtained at a time when the number of stuttered words had gone down at least by 50 per cent).



PIG. II

It is clear from Figure II that the courses of adaptation before and after therapy are very different. Before therapy the number of stuttered words being 421 in the first five minutes goes down to 322 in the second-five minutes. It shows a further but small decrease to 320 in the third and to 317 in the fourth-five minutes. Thereafter the number of stuttered words increases to 382 in the fifth-five minutes and finally to 466 in the sixth-five minutes, as against 421 in the first-five minutes. The trend is essentially similar to that found in the first part.

But the adaptation effect took a different course after therapy. The subjects started with 114 words in the first-five minutes which went on decreasing: 80

in the second-five, 77 in the third-five, 75 in the fourth-five, 57 in the fifth-five and 63 in the sixth-five. Although there is a small increase in the final period the general trend seems to be continuous adaptation effect. What seems to be striking here is the fact that the subjects' stuttering in the final period was much less than what it was in the initial period, a trend which is very different from that observed before therapy in the same subjects.

Discussion

The term adaptation was originally meant decrease in stuttering upon repeated readings of the same passage, but it was subsequently generalised more or less to all types of reading and speech situations including continuous reading of constantly changing materials (Donohue, 1955; Wingate, 1966a). Donohue (1955) who studied adaptation during three hours of continuous reading also reported progressive adaptation effect. Spontaneous recovery, increase in stuttering after sometime following adaptation was also extensively studied (Jones, 1955; Jamison, 1955; Frick, 1955; Fireman, 1955). However, none of the studies report an increase in stuttering *within a reading session* of whatever duration. And this is exactly the trend in stutterers before therapy at least in the present investigation.

The results of the present investigation although coming into conflict with those of the earlier studies, are altogether predicted by modern learning theory. The results of the earlier studies were also explained on the basis of learning principles making use mainly of the concept of laboratory extinction. However, such explanations have been called into question (Wingate, 1966a, 1966b). The concept which seems to adequately account for the increase in stuttering within the reading session is the Hullian principle of reactive inhibition (Hull, 1943). Reactive inhibition is a negative drive state which accounts for work decrement (Hovland, 1958; Woodworth and Schlosberg, 1960). It is similar to what is usually called fatigue, assumed to develop in any response system upon its activation. The accumulated reactive inhibition disrupts the response flow. When a rest pause is given, the reactive inhibition dissipates quickly restoring the original drive state and also the response strength.

Accordingly, the subjects started reading with whatever was the initial level of fluency and started showing gradually adaptation effect. In other words, the performance continued to move towards the optimum level. Nevertheless, reactive inhibition has also been accumulating and by the time it was about 20 minutes of reading it reaches a level where it starts disrupting the performance. And hence, a gradual increase in the number of stuttered words.

The concept of reactive inhibition has been employed by Brutten (1963), Gray (1965) and Brutten and Shoemaker (1966) in explaining the 'adaptation effect' that was seen in the repeated readings of the same passage. However, the concept has been employed differently in the present paper. Brutten and Gray have used the construct reactive inhibition in explaining the *decrease* in

stuttering frequency. The stuttering response generates reactive inhibition and as the reading continues the accumulated reactive inhibition inhibits stuttering response. The result is a decrease in the frequency of stuttering response. On the other hand, the position adopted here is that the so called adaptation simply reflects the tendency to perform at the optimum level under the given conditions. It is the *increase* in the frequency of stuttering that is due to the accumulation of reactive inhibition. (This increase, however has not been reported by others.) It is thought that the reactive inhibition accumulated in the speech response system inhibits stuttering differentially while leaving the general performance unaffected is a difficult assumption to make.

The very term adaptation, it should be added, is rather vague in its connotations. It might be recalled that the same word was once suggested to describe the improvement in performance on learning tasks in psychological laboratories and that subsequently the term came under heavy criticism (Woodworth and Schlosberg, 1960). It is a common observation both in learning experiments and every day experience that any response system takes sometime *after* its actual activation to get itself warmed-up and do its best (Woodworth and Schlosberg, 1960). It might be that what is usually called adaptation, particularly in continuous reading of a long passage simply reflects this warm-up effect. In other words, the stutterer is able to read at his best in that particular situation sometime after the reading task was initiated. The gradual accumulation of reactive inhibition nullifies this optimum performance resulting in a decline in the efficiency. It also looks likely that the tendency towards optimum performance within the limits in continuous reading is different from that in repeated reading. In the former, the stimulus pattern is changing and in the latter, it is constant.

That the subjects continued to show adaptation effects after therapy is also understable in the context of learning theory. It is known that the accumulation of reactive inhibition is directly related to the effort with which a response is made (Hovland, 1958). A response made with greater effort is bound to produce greater amount of reactive inhibition. Conversely, if a response involves less effort, the process of the accumulation of reactive inhibition is slowed down. Stutterers, after receiving therapy, continued to show improved performance till the end of the thirtieth minute when the experiment was discontinued. The same subjects before therapy had shown a reverse of adaptation effect during the fifth-minute period. The continuous gain after therapy was possible for the subjects because now their stuttering had come down by more than 50 per cent, which meant that their reading was less *effortful.* Since the *task* involved in reading was considerably less, reactive inhibition did not accumulate to disrupt the performance within the duration of the experiment. They probably needed more time of reading before reactive inhibition could disrupt the performance.

The Iowa studies on the problem which have reported continuous adaptation in any reading situation were conducted with stutterers who had been receiving

speech therapy, some for weeks and some even for months (Donohue, 1955; Jones, 1955; Jamison, 1955; Frick, 1955; Fireman, 1955). It is possible that their stuttering was largely under control at the time of those studies and hence only the results of the second part of this study are comparable to the results of these studies. However, studies like the one reported by Donohue (1955) present special difficulties. It is very unlikely that a neuromuscular response system like speech which goes into action for as long a period as three hours is not affected by the consequences of such activation. It would be even more difficult to defend the proposition that it goes on endlessly 'improving'.

The hypothesis that the adaptation is similar to extinction has recently been questioned and Wingate (1966a; 1966b) has pointed out some of the important differences between the two. Although it does not follow from this that stuttering cannot be considered as learned (or that it is learned) this question needs to be examined carefully. Nevertheless, there seems to be little value in comparing adaptation with extinction for the simple reason that we do not have the right kind of data to do it. If it is possible to show that simple reading of different passages over and over again on several days results either in the decrease of stuttering in all the situations or that it remains the same, we would be able to learn more about adaptation as against extinction. The available studies, however, have shown spontaneous recovery after sometime following adaptation. Furthermore, there are several apparent differences between the two, apart from those summarized by Wingate (1966a; 1966b). In no learning laboratory a response which was learned in life situations, which was continuously in force for several months or years and had acquired such habit strength as stuttering or phobia in the majority of the cases will have done, was ever extinguished in a short period with simple laboratory procedures without any therapeutic intervention. What was extinguished in a laboratory was usually a response learned there. Besides, there are some important differences between a normal and a neurotic response. The latter is characterized by a type of rigidity, fixation, and a tendency toward self defeat (Eysenck and Rachman, 1955; Mowrer, 1966) which is not quite true of the former. Consequently, those aspects of learning theory which deal with the learning and unlearning of abnormal responses should be more relevent to a discussion on stuttering (e.g., Solomon, 1964).

The above discussion makes it clear that the adaptation effect may be different from extinction and that we need different kinds of evidence than what we have, to come to a definite conclusion. However, it does not mean that this aspect of stuttering cannot be accounted for by some of the learning principles. As mentioned above the improved performance of stutterers in reading situations can be adequately explained by learning theory. An initial drop in the number of stuttered words and a gradual increase in the same before the therapy in contrast to continuously improved performance upto thirty minutes in subjects taking therapy lends further support to this interpretation.

Summary and Conclusions

Eighteen stutterers before receiving therapy and ten stutterers after speech shadowing therapy were studied for adaptation. The subjects read long passages continuously for thirty minutes. The experimenter counted the number of stuttered words separately for every five minutes duration The course of adaptation was different before and after therapy and both are different from what is reported in the literature. Before the therapy the number of stuttered words went on decreasing but only upto the twentieth minute; thereafter it increased, finally reaching the initial level of stuttering by the thirtieth minute. After the therapy, however, the subjects showed continuous adaptation till the end of the experiment. The results were discussed in terms of modern learning theory and the following conclusions seem warranted:

1. The adaptation probably reflects the warm-up effects and it is thus an indication of a stutterer's optimum performance under a given condition.
2. The increased stuttering after twenty minutes of reading is probably due to the accumulation of reactive inhibition because their reading was quite effortful.
3. After the therapy, adaptation was continuous throughout the experiment because the subjects' reading involved less effort, and consequently the accumulation of reactive inhibition was slowed down.
4. Although adaptation does not seem to be similar to extinction, this aspect of stuttering can adequately be accounted for by modern learning theory.

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